Robust and powerful Slim PC to support three displays

The Shuttle Barebone DS87 is a robust 1.3L Barebone-PC with H87 chipset for Intel LGA1150 desktop processors. Compared to its DS81 sibling, the DS87 now allows for three displays instead of two to be operated at the same time. Its slim metal chassis including a VESA mount, versatile connectivity and reliable operation in up to 50°C of ambient temperature make it ideal to be used with professional applications such as Digital Signage, POS, POI, gambling machines, office, healthcare and industry.

1.3L Slim PC Barebone

DS87

Images for illustration only.
Processor, memory, storage and operating system not included.

Feature Highlights

Slim Design	• Slim 1.3 litre metal chassis, black • 190 x 165 x 43 mm (LWH) • Operating temperature: 0~50°C • Including VESA mount (75/100 mm)
Operating System	• The operating system is not included • Compatible with Windows 7 / 8.1, Linux
Processor	• Supports LGA 1150 CPUs, max. 65W TDP • Supports Core i7 / i5 / i3, Pentium, Celeron • Heatpipe cooling system with two fans
Chipset	• Intel H87 Express Chipset
Memory	• 2x 204 pin SO-DIMM slots • Supports DDR3-1333/1600, max. 2x 8 GB
Graphics	• Integrated Intel HD graphics, 4K support (features depends on processor) • HDMI, 2x DisplayPort, optional VGA (PVG01) • Supports three independent displays
Storage Bays	• Bays: 1x 6.35cm/2.5" for hard disk or SSD • Two Mini expansion slots: 1x Full-Size (supports mSATA 6 Gb/s) 1x Half-Size PCIe for optional WLAN WLN-S
Other Connectors	• SD card reader, 2x Audio (Line out, mic) • 2x USB 3.0 (rear), 6x USB 2.0 (4x front) • 2x Gigabit LAN (RJ45), supports WOL, PXE • 2x COM ports (RS232 + RS232/RS422/RS485) • Connector for external power button • "Always on" Jumper onboard
Power Supply	• External 90W fanless power adapter
Applications	• Digital Signage, POS, control device, etc.

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UPC bar code: 811686006886

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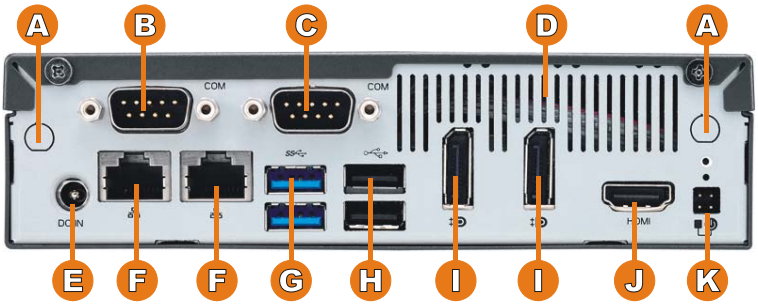
Shuttle Slim PC Barebone DS87 – Front and Back Panel

Front view

1 Microphone input
2 Headphone output
3 Power LED
4 Hard disk LED
5 Power Button
6 SD Card Reader
7 4x USB 2.0

Rear view



A 2x WLAN perforation
B RS232/RS422/RS485
C RS232 (or optional VGA port for analog displays [9])
D Ventilation grille
E DC power input
F 2x RJ45 Gigabit LAN
G 2x USB 3.0
H 2x USB 2.0
I 2x DisplayPort (DP) video output
J HDMI video output
K Connector for external power button, Clear CMOS and 5V DC voltage (four pins, 2.54 mm pitch)
L 2x holes for Kensigton Lock
M VESA mount (two parts)

Right side

Left side

COM port Pin 9 Configuration
Pin 9 is a multi-functional signal. Based on jumper configuration on the mainboard, it can be configured as Ring Indicator (RI) or external power supply with either 5V or 12V voltage level (each COM port separately).

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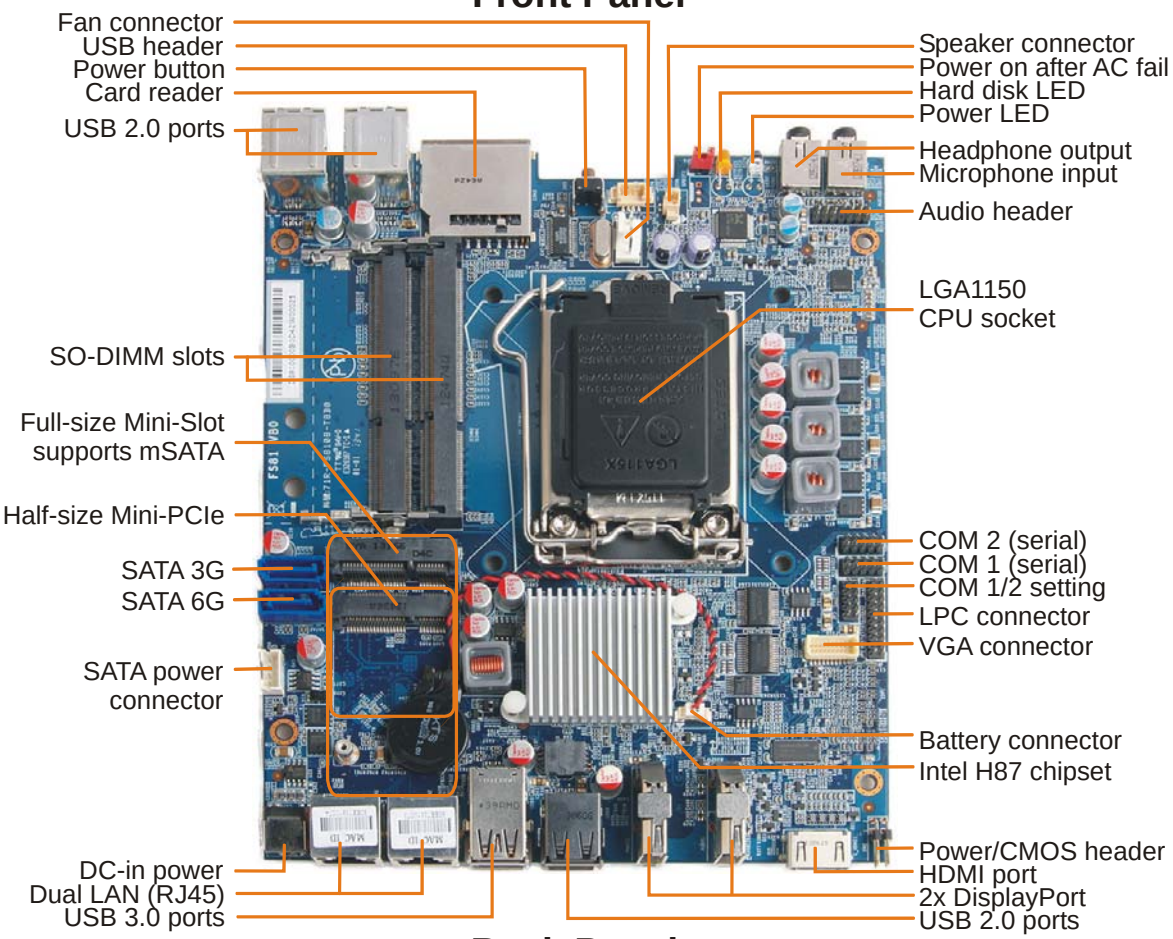
Shuttle Slim PC Barebone DS87 – Mainboard

Front Panel



Back Panel

Top view without chassis cover (with and without drive tray and cooling system)

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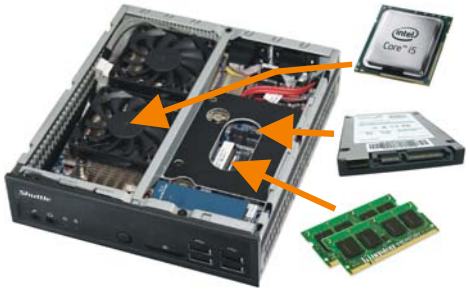
Shuttle Slim-PC Barebone DS87 – Product Features

Robust, stylish and particularly small

You should have held it in your own hands to see how small it actually is. Barely measuring a volume of 1.35 litre, its steel chassis gives it the appropriate stability required for professional applications in digital signage. Despite its dimensions of 19 x 16.5 x 4.3 cm (LWH), the overall system performance is very high thanks to support of Intel Core desktop processors. The interior of the DS87 is very tidy too so that it won't take long to set it up. Its sleek and stylish looks lets it easily find a place in both home and office environments.



What does Barebone mean?

The Shuttle Slim-PC Barebone DS87 consists of a stylish metal case with a pre-installed mainboard, cooling system and external power adapter. Despite its small form factor, it offers outstanding connectivity, functionality and performance. For a complete Mini PC system, a few components still need to be added. The Mini PC is customisable and takes socket 1150 processors (max. 65W TDP), DDR3 SO-DIMM memory and a 2.5" storage drive (hard disk or SSD). Once the desired operation system is installed, the DS87 is ready to use. The system features pre-routed cables that are tied down from factory to reduce clutter, increase airflow and ease component installation.

Supports LGA1150 processors and up to 16 GB DDR3

A wide range of socket 1150 Intel "Haswell" processors (also "Haswell Refresh") is available ranging from Celeron to Core processors with a maximum TDP of 65W. Plus, up to a maximum capacity of 16 GB of DDR3 memory can be fitted.

Low noise thanks to heatpipe cooling system

An active dual-fan heatpipe cooling system ensures whisper-quiet operation and system stability.

Extended temperature range and reliability

The DS87 is outstandingly robust thanks to its rugged chassis. With an ambient temperature range from 0-50 °C it is suitable for use in the most demanding environments. Solely designed with all solid capacitors, DS87 is guaranteed to deliver maximum stability, reliability and longer system lifetime for long-term applications like digital signage.

Caution: for high ambient temperatures over 40°C we strongly recommend to use SSDs (supporting at least 70°C) and rugged SO-DIMM memory with a wide temperature tolerance (up to 95°C).

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Energy-saving

The power consumption mainly depends on the processor in use and its load. Using an Core i5-4670 (3.1 – 3.8 GHz, TDP = 65W) processor, the system consumes about 22W in idle mode. Under full load, the power consumption is 70W.
Note: the maximum output wattage of the power adapter is specified with 90W. Assuming the adapter's efficiency is 90%, the input wattage can reach up to 100W.

Great Connectivity

Despite its small size, DS87 sports a wide range of I/O connectors. Besides the SD card reader, it features a couple of USB 3.0, six USB 2.0, Dual Gigabit LAN, digital video, audio and two serial ports.

SD Card Reader

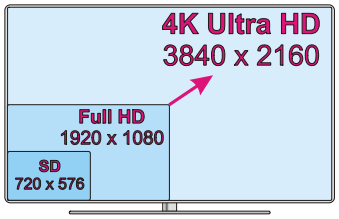
The built-in SD card reader at the front side makes it easy to transfer files from your camera so you can share videos and photos on your DS437 with ease. It supports SD, SDHC and SDXC memory flash cards in standard size format also supports boot up from bootable SD cards.

Dual Gigabit LAN Network

Today's media-rich communications across the internet and within enterprises create need for bandwidth. This is why Shuttle applies Gigabit-LAN performance to their Mini PCs and DS87 even supports two of them. Dual networking allows the computer to connect to a single network using two cables at once with an appropriate switch (teaming mode with load balancing or failover function) or to two different networks depending on the needs of the user.

Triple Display with HDMI and 2x DisplayPorts (optional VGA)

DS87 features three digital video outputs: HDMI and 2x DisplayPort. This multi-monitoring technology offers multiple display support on up to three separate monitors. This helps improve on productivity by allowing for spreading multiple windows across two monitors while working with them simultaneously. Furthermore, the DS87 supports an optional D-Sub/VGA port. [see below]



Supports 4K Ultra HD at 60Hz

The DS87 supports displays running at 4K (3840 x 2160 / 2160p) high resolution at 60Hz frames per second when connected to its DisplayPort video outputs. Being the successor to the Full HD standard, Ultra HD delivers a four times higher resolution with a wider colour space and colour depth.

Optional VGA port (Accessory PVG01)

The mainboard features one analog graphics port. This 15-pin D-Sub VGA connector can be lead to the outside of the backpanel by using an optional adapter PVG01. However doing so means one serial port (COM) less can be used at the backpanel.

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Two serial ports

Many PCs do not have these legacy ports any longer, since they have been superseded and replaced by USB for most consumer applications, but they are still commonly used for applications such as industrial automation systems, scientific analysis, POS systems and other industrial applications. The DS87 features two serial RS-232 ports which also support both 5 or 12V auxiliary voltage. The left COM port also supports the RS422 and RS485 standard.

Slots for mini expansion cards

The DS87 features two slots for Mini expansion cards. One is a half-size Mini-PCIe-slot dedicated for Wireless LAN adapter cards (e.g. the accessory WLN-C). The second is of full-size format and it supports mSATA (Mini Serial ATA) cards. This means even the new generation of Solid State Drives (SSD) in a compact Mini PCIe card form factor can be used. The mSATA interface supports a transfer rate of up to 6 Gb/s for super high-speed storage.
Photos: half-size WLAN card (left) and full-size mSATA SSD card (right).

Optional WLAN kit “WLN-S”

The Shuttle Slim-PC Accessory WLN-S is a wireless LAN kit consisting of a Mini-PCIe card, two antennas and appropriate cables. With WLN-S you can equip the DS87 with the wireless LAN standard according to IEEE 802.11b/g/n. Data transfer speeds of up to 300 MBit/s can be reached and WPA2 with AES encryption is supported, too.

VESA mount

The supplied 75/100mm VESA mount allows for installation on to walls or monitors which is particularly interesting for the industry segment, company buildings and public institutions. Other than this, the chassis bears numerous threaded holes (M3) enabling it to be fitted almost anywhere.

Kensington Lock

This is a small, metal-reinforced hole as part of an anti-theft system. The DS87 provides an appropriate hole on both side of its chassis. The lock and cable are not included.

External power button by separate remote line

If because of space constraints (e.g. in case of fixed installation), the machine cannot be switched on by pressing the front power button, it can be powered on by a separate remote line. You will find an appropriate four-pin-connector at the back panel of the DS87 (pitch 2.54 mm). Furthermore, this connector provides a Clear CMOS function and +5V DC voltage supply for external devices.

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Front Panel

Power on after Power fail

The BIOS setup provides a "Power-On after Power Fail" function that can be found under "Power Management Configuration". As the name indicates, this function determines the PC's behaviour after power failure: (1) unconditional power on, (2) restore former status or (3) keep system turned off. As a matter of the nature of this function, it may fail after short power failures. This is why the DS87 also comes with a hardware-based solution. By removing Jumper 4 (see image) the system will start unconditionally once power is applied.

	DS81	DS87
Chipset	H81	H87
Displays supported	2	3

DS81 versus DS87

DS81 and DS87 distinguish themselves through their chipset. While DS81 supports dual independend displays the DS87 even supports three displays simultaneously.

Shuttle Slim PC Barebone DS87 – Required Components

The following components need to be added to make it a fully-configured Mini PC

LGA1150 processor
TDP max. 65W
Core i7 / i5 / i3, Pentium or Celeron

2.5” SATA hard disk
or Solid State Disk (SSD)
(max. 12.7 mm height)

Windows / Linux
Operating System

Up to two DDR3-1333/1600
SO-DIMM memory modules
max. 8GB each

Optional:
WLAN-Accessory WLN-S

Optional:
mSATA SSD storage

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Connectivity / Applications

The DS87's great connectivity makes it well-suited for a wide field of applications and external devices.

The DS87 is your powerful 1.3-litre Slim-PC solution for particularly:

- Digital Signage with up to three displays simultaneously
- In-store Audio/Video entertainment
- Gambling
- Home-Media
- Office
- Call Center
- Education
- Kiosk
- Point of Sales (POS)
- Medical
- Automation
- Small server

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Shuttle Slim PC Barebone DS87 - Specifications

Chassis	Nettop PC with black chassis made of metal Dimensions: 190 x 165 x 43 mm (LWH) = 1.35 litres Weight: 1.3 kg net and 2.1 kg gross Two holes for Kensington Locks and numerous threaded holes (M3) at both sides of the chassis
Storage Bay	1x 6.35cm / 2.5" storage bay supports one hard disk or SSD drive Height: 9.5 or 12.7mm (max.)
Operation System	This system comes without operating system. It is compatible with Windows 8 / 8.1, Windows 7, Linux
Mainboard *Chipset* *BIOS*	Mainboard: Shuttle FS87/FS81 (8 layer design) Mini-ITX form factor 17 x 17 cm Chipset: Intel® H87 (Intel® DH82H87 PCH) AMI BIOS in 8 Mbit EEPROM with SPI interface All capacitors are high quality solid capacitors Supports hardware monitoring and watch dog functionality Supports Unified Extensible Firmware Interface (UEFI) [2] Supports power on after power failure [8]
Power Adapter	External 90W power adapter (fanless) Input: 100~240V AC, 50/60 Hz Output: 19V DC, 4.74A, max. 90W DC Connector: 5.5/2.5mm (outer/inner diameter)
Processor Support	Socket LGA 1150 (H3) supports the fourth generation of Intel Core i7 / i5 / i3 / Pentium processors Maximum supported processor power consumption (TDP) = 65W Codename "Haswell", 22nm technology, up to 8 MB of L3 cache Supports the new generation of "Haswell Refresh" processors Not compatible with older Socket LGA 1155 processors Does not support the unlock-function of Intel K-Series processors The processor integrates PCI-Express, memory controller and graphics engine on the same die (depending on processor) Please refer to the support list for detailed processor support information
Processor Cooling	Heatpipe processor cooling with two 60mm fans on the upper side of the chassis
Memory Support	2x SO-DIMM slots with 204 pins Supports DDR3-1333/1600 SDRAM memory (PC3-10600/12800) The maximum memory clock rate depends on the processor type Supports Dual Channel mode Supports max. 8 GB per DIMM, maximum total size of 16 GB Supports two unbuffered DIMM modules of 1.5V

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Integrated Graphics	The features of the integrated graphics function depend on the used processor type. [3] Max. shared memory 1792 MB Three digital video outputs: 2x DisplayPorts and 1x HDMI - support three independent displays simultaneously - support Full HD resolution at 1920x1200 (1080p/60Hz) - support 4K UHD resolution at 3840 x 2160 (2160p/60Hz for DP, 30Hz for HDMI) [10] - support Blu-ray (BD) playback with HDCP - support HD video plus multi-channel digital audio via a single cable. Optional analog D-Sub/VGA video output [9]
Mini- slots	features two Mini expansion slots: 1) half size Mini-PCIe, supports PCIe 2.0 and USB 2.0 e.g. for WLAN cards [5] 2) full size mSATA, unterstützt PCIe 2.0, SATA 6G and USB 2.0 e.g. for Mini SATA (mSATA) flash memory cards [6]
Audio	Audio Realtek® ALC 662-VC High-Definition Audio Two analog audio connectors (3.5mm) at the front panel: 1) 2 channel line out (head phone) 2) microphone input Digital multi-channel audio output: via HDMI and DisplayPort
Dual Gigabit LAN Controller	Dual Realtek 8111G Ethernet network controller (Gigabit) Supports 10 / 100 / 1.000 MBit/s operation With two RJ45 ports (dual network) supports Teaming [4] Supports WAKE ON LAN (WOL) Supports network boot by Preboot eXecution Environment (PXE)
Drive Connectors	1x Serial-ATA III, 6 Gb/s (600 MB/s) bandwidth 1x Serial-ATA II, 3 Gb/s (300 MB/s) bandwidth With Serial-ATA power connector (onboard) Supports Unified Extensible Firmware Interface (UEFI) [2]
Card reader	Integrated card reader supports SD, SDHC and SDXC memory flash cards Supports boot up from SD card
Front Panel Connectors	Microphone input Audio Line-out (headphone) 4x USB 2.0 SD card reader Power button Power LED (blue) HDD LED (yellow)

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Back Panel Connectors	1x HDMI connector [1] 2x DisplayPort connectors (DP, supports 4k resolution) Optional 1x D-Sub VGA connector (Accessory PVG01 [9]) 2x USB 3.0 2x USB 2.0 2x Gigabit LAN (RJ45) 2x RS232 serial ports (5V/12V, 1x switchable to RS422 / RS485) DC-input connector for external power adapter Four pin connector (2.54 mm pitch) supports - external power on button - Clear CMOS function - +5V DC voltage for external components Perforation for optional Wireless LAN antennas (2 holes)
Other Onboard Connectors	Power on after power fail (hardware solution, Jumper 4) [8] 1x analog VGA graphics output (2x10 pins, 1mm pitch) [9] 1x USB 2.0 (4 Pins) 2x serial interface (COM) occupied for back panel connectors Fan connector (4 pins) occupied by the cooling system LPC interface (2x10 pins) Audio connectors (7x2 pins) Speaker connector (2 pins) Power connector for SATA drives (4 pins)
Scope of delivery	Multi-language user guide VESA mount for 75/100mm standard (two metal brackets) Four thumbscrews M3 x 5 mm (screws together VESA mount and PC) Four screws M4 x 10 mm (to fix the VESA mount to the external device) Four screws M3 x 4 mm (to mount a 2.5" storage into the bay) Driver DVD (Windows 7/8 32/64 bit) Serial ATA cable for 2.5" drive including power cable External power adapter with power cord Heatsink compound
Optional Accessory	(1) **WLN-S:** Wireless LAN kit consisting of a Mini-PCIe card, two antennas and appropriate antenna cables. (2) **PVG01:** optional D-Sub VGA video output [9]
Environmental Specifications	Ambient temperature range: 0~50°C [7] Relative humidity, non-condensing: 10~90%
Conformity Certifications	EMI: FCC, CE, BSMI, C-Tick Safety: CB, BSMI, ETL This device is classed as a technical information equipment (ITE) in class B and is intended for use in living room and office. The CE-mark approves the conformity by the EU-guidelines: - EMV-guideline 89/336/EWG electromagnetic tolerance - LVD-guideline 73/23/EWG use of electric devices within certain voltage-limits

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Footnotes:

[1] HDMI video output supports DVI-D with optional adapter.
[2] Unified Extensible Firmware Interface (UEFI): required when booting from hard disks larger than 2.2 TB under Windows 64 bit operating systems such as Windows 7/8, Windows Vista SP1 and Windows Server 2008/2003 SP1.
[3] Integrated video outputs (HDMI and DisplayPorts): Not all LGA1150 Intel processors may support integrated graphics. Please check the specification of the used processor. If you want to use the video outputs, then please make sure that the used processor has integrated graphics.
[4] Teaming Mode
The teaming function allows you to group both available network adapters together to function as a single adapter - a method of creating a virtual LAN. The benefit of this approach is that it enables load balancing and failover.
[5] Optional Wireless LAN module:
This Slim PC supports an optional WLAN module in the form of a half-size Mini-PCIe card with IEEE 802.11n functionality and an external antenna with appropriate antenna cable. Shuttle therefore offers a suitable accessory kit "WLN-S" with two antennas.
[6] mini-SATA (mSATA)
is a newer industry standard which converts the electrical SATA interface (1.5 or 3.0 Gbit/s) to the pysical "Mini PCI Express" mini card form factor. Not to be confused with the "micro SATA" connector.
[7] Caution: for high ambient temperatures over 40°C we strongly recommend to use SSDs (supporting at least 70°C) and rugged SODIMM memory with a wider temperature range (up to 95°C).
[8] Power on after power fail:
The BIOS setup provides a "Power-On after Power Fail" function that can be found under "Power Management Configuration". As the name indicates, this function determines the PC's behaviour after power failure: (1) unconditional power on, (2) restore former status or (3) keep system turned off. As a matter of the nature of this function, it may fail after short power failures. This is why the DS87 also comes with a hardware-based solution. By removing Jumper 4 (to be found on the mainboard besides the hard disk LED) the system will start unconditionally once power is supplied.
[9] Optional D-Sub/VGA connector
The mainboard features one analog graphics port. This 15-pin D-Sub VGA connector can be lead to the outside of the backpanel by using an optional adapter PVG01. However doing so means one serial port (COM) less can be used at the backpanel.
[10] 4K Ultra-HD resolution
A 4K-display with Ultra-HD resolution (3840 x 2160) should be connected via DisplayPort, as only this port supports a higher refresh rate of 60Hz. Certain displays (e.g. Dell UP2414Q) however require MST mode (Multi-Stream Transport) to be enabled which sends two separate images at half resolution each to the display. These two images are then combined and put in correct order by the Intel graphics driver when in Collage mode. Please note that HBR2-mode (High Bit Rate 2) must be supported by each display to have more than one of them run at 4K resolution.

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4th Generation Intel Core Processor Family

LGA1150 socket 22nm "Haswell" processor overview (Date: August 2014)

Processors with TDP>65W are not supported by DS87 (highlighted grey)

Name	Model	Cores	HT	Clock	Turbo	Cache	TDP	Graphics	GPU max.	DDR3
Core i7	4790	4	Yes	3.6 GHz	4.0 GHz	8 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4790S	4	Yes	3.2 GHz	4.0 GHz	8 MB	**65 W**	HD 4600	1.20 GHz	1333/1600
	4790T	4	Yes	2.7 GHz	3.9 GHz	8 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4785T	4	Yes	2.2 GHz	3.2 GHz	8 MB	35 W	HD 4600	1.20 GHz	1333/1600
	4771	4	Yes	3.5 GHz	3.9 GHz	8 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4770K	4	Yes	3.5 GHz	3.9 GHz	8 MB	**84 W**	HD 4600	1.25 GHz	1333/1600
	4770	4	Yes	3.4 GHz	3.9 GHz	8 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4770S	4	Yes	3.1 GHz	3.9 GHz	8 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4770T	4	Yes	2.5 GHz	3.7 GHz	8 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4770TE	4	Yes	2.3 GHz	3.3 GHz	8 MB	45 W	HD 4600	1.00 GHz	1333/1600
	4765T	4	Yes	2.0 GHz	3.0 GHz	8 MB	35 W	HD 4600	1.20 GHz	1333/1600
Core i5	4690T	4	-	2.5 GHz	3.5 GHz	6 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4690S	4	-	3.2 GHz	3.9 GHz	6 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4690	4	-	3.5 GHz	3.9 GHz	6 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4670T	4	-	2.3 GHz	3.3 GHz	6 MB	45 W	HD 4600	1.20 GHz	1333/1600
	4670S	4	-	3.1 GHz	3.8 GHz	6 MB	65 W	HD 4600	1.20 GHz	1333/1600
	4670K	4	-	3.4 GHz	3.8 GHz	6 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4670	4	-	3.4 GHz	3.8 GHz	6 MB	**84 W**	HD 4600	1.20 GHz	1333/1600
	4590T	4	-	2.0 GHz	3.0 GHz	6 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4590S	4	-	3.0 GHz	3.7 GHz	6 MB	65 W	HD 4600	1.15 GHz	1333/1600
	4590	4	-	3.3 GHz	3.7 GHz	6 MB	**84 W**	HD 4600	1.15 GHz	1333/1600
	4570TE	2	Yes	2.7 GHz	3.3 GHz	4 MB	35 W	HD 4600	1.00 GHz	1333/1600
	4570T	2	Yes	2.9 GHz	3.6 GHz	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4570S	4	-	2.9 GHz	3.6 GHz	6 MB	65 W	HD 4600	1.15 GHz	1333/1600
	4570	4	-	3.2 GHz	3.6 GHz	6 MB	**84 W**	HD 4600	1.15 GHz	1333/1600
	4460T	4	-	1.9 GHz	2.7 GHz	6 MB	35 W	HD 4600	1.10 GHz	1333/1600
	4460S	4	-	2.9 GHz	3.4 GHz	6 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4460	4	-	3.2 GHz	3.4 GHz	6 MB	**84 W**	HD 4600	1.10 GHz	1333/1600
	4440S	4	-	2.8 GHz	3.3 GHz	6 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4440	4	-	3.1 GHz	3.3 GHz	6 MB	**84 W**	HD 4600	1.10 GHz	1333/1600
	4430S	4	-	2.7 GHz	3.2 GHz	4 MB	65 W	HD 4600	1.10 GHz	1333/1600
	4430	4	-	3.0 GHz	3.2 GHz	6 MB	**84 W**	HD 4600	1.10 GHz	1333/1600
Core i3	4370	2	Yes	3.8 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4360T	2	Yes	3.2 GHz	-	4 MB	35 W	HD 4400	1.15 GHz	1333/1600
	4360	2	Yes	3.7 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4350T	2	Yes	3.1 GHz	-	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4350	2	Yes	3.6 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4340	2	Yes	3.6 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4330TE	2	Yes	2.4 GHz	-	4 MB	35 W	HD 4600	1.00 GHz	1333/1600
	4330T	2	Yes	3.0 GHz	-	4 MB	35 W	HD 4600	1.15 GHz	1333/1600
	4330	2	Yes	3.5 GHz	-	4 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4160T	2	Yes	3.1 GHz	-	3 MB	35 W	HD 4400	1.15 GHz	1333/1600
	4160	2	Yes	3.6 GHz	-	3 MB	54 W	HD 4600	1.15 GHz	1333/1600
	4130T	2	Yes	2.9 GHz	-	3 MB	35 W	HD 4400	1.15 GHz	1333/1600
	4130	2	Yes	3.4 GHz	-	3 MB	54 W	HD 4400	1.15 GHz	1333/1600

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Name	Modell	Kerne	HT	Takt	Turbo	Cache	TDP	Grafik	GPU max.	DDR3
Pentium	G3460	2	-	3.5 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3450T	2	-	2.9 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3450	2	-	3.4 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3440T	2	-	2.8 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3440	2	-	3.3 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3430	2	-	3.3 GHz	-	3 MB	53 W	HD	1.10 GHz	1333/1666
	G3420T	2	-	2.7 GHz	-	3 MB	35 W	HD	1.10 GHz	1333/1666
	G3420	2	-	3.2 GHz	-	3 MB	53 W	HD	1.15 GHz	1333/1666
	G3320TE	2	-	2.3 GHz	-	3 MB	35 W	HD	1.00 GHz	1333/1666
	G3250T	2	-	2.8 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3250	2	-	3.2 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
	G3240T	2	-	2.7 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3240	2	-	3.1 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
	G3220T	2	-	2.6 GHz	-	3 MB	35 W	HD	1.10 GHz	1333
	G3220	2	-	3.0 GHz	-	3 MB	53 W	HD	1.10 GHz	1333
Celeron	G1850	2		2.9 GHz	-	2 MB	53 W	HD	1.05 GHz	1333
	G1840T	2		2.5 GHz	-	2 MB	35 W	HD	1.05 GHz	1333
	G1840	2		2.8 GHz	-	2 MB	53 W	HD	1.05 GHz	1333
	G1830	2	-	2.8 GHz	-	2 MB	54 W	HD	1.05 GHz	1333
	G1820TE	2	-	2.2 GHz	-	2 MB	35 W	HD	1.00 GHz	1333
	G1820T	2	-	2.4 GHz	-	2 MB	35 W	HD	1.05 GHz	1333
	G1820	2	-	2.7 GHz	-	2 MB	54 W	HD	1.05 GHz	1333

K = unlocked, **S** = Performance optimized lifestyle, **T** = Power optimized lifestyle, **HT** = Hyper Threading (SMT).
Please refer to the support list for detailed processor support information at *global.shuttle.com*.

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